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ABSTRACT

Increased emphasis on academic and mathematical skills in high school courses such as "technology education" appeal only to the above average and motivated students, leaving a large majority of less-able students with a distorted view of future jobs, which do not, in fact, require such an academic approach. At the same time, industrial arts courses, which could provide the skills needed by more students, are less favored. Even if most new jobs are in the service and sales sectors, workers will need to understand the products they sell. Industrial arts and technology are not diametrically opposed. A great deal of common ground exists between the two possible extremes. For example, several proponents of technology believe that a hands-on, project-oriented approach is necessary in order to reach the student. The real difference between industrial technology education and industrial arts is focus. Industrial technology education advocates want to focus on technology, its effects on society, and the effects of people on it. Industrial arts supporters prefer a focus on the materials and processes of industry. However, the current focus in the United States is on educating the whole child, and it would seem necessary to include both industrial technology and traditional skills as a sufficiently diverse background to allow students to grow and change. Therefore, the best of each approach should be selected and included in an overall strategy for educating students of all ages. (KC)

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Industrial Arts and Technology: A Paradigm

"The move to technology education comes at a very propitious time. It comes at a time when the public and the educational establishment are demanding more from all areas of study, and particularly the `nonbasic' subjects. Technology education has the potential for providing that `more' over industrial arts" (Maley, 1987, p. 4). However, one faction of contemporary industrial arts educators believe that traditional courses, focused on the materials of industry, is the best choice, while another contingent insists that the focus must be on all technology. A third segment believes the content should be limited to industrial technology.

Technology education concentrates on the type of students who are "generally high achievers with strong motivation and above-average intelligence. We must continue to give motivation and achievement potential to the student with average or below-average intelligence" (Schilleman, 1987, p. 28). Berryman (1987) states that "school learning is mostly symbol-based, to such an extent that connections to the things

being symbolized are often lost" and can complicate learning for the less able (p. 8).

This "forgotten half", those students not destined to attend college or possibly not even finish high school, are a major concern of the industrial arts faction. This is not to imply that Industrial arts programs have nothing to offer students with greater than average intelligence. In fact, they can offer a great deal.

> The child who drops out--or behaves so intolerably that he or she is pushed out--may not be able to envision and emotionally claim an adult future that requires the core curriculum of the high school. When schools concentrate on narrow verbal and mathematical-logical skills, though Lord knows that these are important, I suggest that we may unintentionally be limiting the child's vision of adult jobs to ones that are highly academic in content, whereas in fact only a small share of total jobs are of this nature. (Berryman, 1987, p. 6)

These students will then be denied any real chance of experiencing the leadership and role modeling provided through interaction with an industrial arts instructor.

In a research project conducted to determine the perceived importance of 48 "objectives" to; parents, students, teachers, administrators, and college professors, Bonfadini (1984) found that the opinions of students and their parents differed drastically from college professors. The highest ranking for students were "work safely" and "get a job". The highest for parents were "work safely" and "care for tools and machines" followed by "work in job training classes" and "get a job". For college professors these areas were number 20, 10, 47, and 37 respectively. This leads us to ask who should determine the content of industrial arts classes? Shouldn't industrial arts fulfill the needs and wants of its clients?

Frequently, in order to support a move away from the study of industry, reference is made to a post-industrial economy. This shift, according to Cohen and Zysman (1987) is a myth. Products will always be required for consumption. The economy will then still

be controlled to a large degree by the production of products. Hence, a continuing reliance on manufacturing and industry.

The fastest growing occupational fields are sales and service. According to Workforce 2000, between 1984 and 2000 service occupations will provide 5,957,000 new jobs while marketing and sales will account for 4,150,000 new jobs. Won't these two groups of individuals need a thorough understanding of the products they are to service and sell? Where will they get this skill, if not through industrial arts?

> Students must develop basic occupational skills, as well as basic academic skills, and learn the characteristics of an occupation before choosing a vocational training program. . . . The industrial arts program should parallel the occupational training programs offered by the local trade and industrial and post-secondary technical education institutions (Godla, 1988, p. 27).

"The basic skills and achievements acquired in a traditional industrial education program will never become obsolete and they can apply to more

sophisticated technical equipment in postsecondary programs or on the job at a later date" (Schilleman, 1987, p. 29).

Additionally, federal funds from the Carl D. Perkins Vocational Education Act "must be used in accordance with overall prevocational and vocational purposes of the act" (Godla, 1988, p. 27). These include learning experiences involving activities such as experimenting, designing, constructing, evaluating, and using tools, machines, materials, and processes.

We live in a highly technical and technological society. We must work, recreate, and just plain survive in it. Consequently, an understanding of technology seems imperative (Maley, 1985).

Lux (1985) states that it is indeed possible to teach all of technology. But, to do so without content such as food technology, or medical technology will lead to knowledgeable individuals perceiving the movement as ill informed. "No one profession or curriculum area has sole province to technology education" (Waetjen, 1987, p. 10).

Industrial arts and technology are not diametrically opposed. A great deal of common ground exists between the two possible extremes. For example, several proponents of technology believe that a hands-on project oriented approach is necessary in order to reach the student (Lux, 1985; Waetjen, 1987; Lauda, 1985). Many industrial arts teachers believe that it is necessary to include technological advances into their curricula (Feirer, 1985).

Technology education is a broad all encompassing field, while industrial arts concentrates on one area of technology; the industrial. They are not the same thing nor is it necessary that technology education displaces industrial arts.

If technology education (the physics approach) replaces industrial arts (the skills approach), will it be necessary to create a new field of education such as "industrial psychomotor skills"? Certainly individuals who cannot perform minor house repairs, or purchase consumer items with an understanding of what it takes to create them, is handicapped in this high paced, high priced, product oriented society.

Gradwell (1988) emphasizes that the "one fundamental strength of technology education is the practical, constructing, project component" (p. 6). In doing so, he strengthens his argument by citing Ferier's (1983) editorial in Industrial Education where he emphasized that, of the 17 innovative curriculum projects, all but one have disappeared, probably due to the lack of hands-on-activities. Gradwell (1988) also cautions the profession not to align itself too closely with applied science.

> European countries take into account the need for both the hardware of new technology as well as a commitment to upgrading workers' skills. There is heavy investment in apprenticeship programs. In addition, this commitment is fostered by a society that looks favorably on craftsmanship. There is still pride in a skilled trade as an honorable profession (Green, 1988, p. 5).

The real, and seemingly only substantial, difference between industrial technology education and industrial arts is one of focus. Industrial technology education advocates want to focus on technology, it's

effects on society and man's effects on it. Industrial arts supporters prefer a focus on the materials and processes of industry.

If forced to make a choice between traditional industrial arts (teaching of skills on old style machines excluding new developments) and technology education (a scientific approach without the use of tools and projects). Many professionals would be forced to choose industrial arts. However, as always, the choice is not that simple. Industrial arts can, and does in many instances, include teaching with and about new technology. Technology education can include projects and the use of tools to develop skills.

An educator's choice, must be for the students. What will they need? What will they profit from most? Certainly an understanding of technology is essential in our rapidly changing world. However, they can also profit by the ability to skillfully use tools on both the vocational and avocational levels.

The focus in America is currently on educating the whole child and it would seem necessary to include both industrial technology and traditional skills as a

sufficiently diverse background to allow them to grow and change in their future.

An Alternative Approach

The best of each approach should be selected and included into an overall strategy for educating students of all ages. Technology is indeed all pervasive and a need exists for individuals with skills in the use of tools, materials and processes. With these points in mind the following logical organizational structure would provide for smooth articulation between elementary education, which should be broad based and college education which should be more focused.

Elementary students would receive occupational awareness activities in the broad field of technology. Projects would be constructed reflecting concepts and activities in the various areas of technology.

The junior high or middle school students would all be required to take industrial technology education in which they investigate the clusters. Content will be on a familiarization level, with an emphasis on project activities.

In high school, industrial arts will specialize within the clusters. This would allow students to specialize in an area of personal interest. Additionally, if any of these students are vocationally inclined, they will already have an adequate introduction to the occupational areas, within the clusters, to make an informed choice for two years of vocational training.

At the college level, for teachers of industrial arts, more in depth study of topics within each cluster will be necessary. For those intending to work in industry, a great deal of depth in one of the clusters would be required.

Figure 1 graphically represents the relationship between these levels and specialties.

(INSERT FIG.1 ABOUT HERE)

This view is without a doubt myopic. But, it's intent is to stress the need for skill development in the use of tools concomitant with knowledge and skill in the use of industrial technology. In short, a modern program of industrial arts as described by Feirer (1985).

Industrial arts at the senior high school should continue modernized programs in drafting/design, woodwork, metalwork, electrical/electronics, graphic arts, power/auto, and plastics. Hi-tech can be incorporated into each of these areas while maintaining the technical/skill and knowledge approach. (p. 17)

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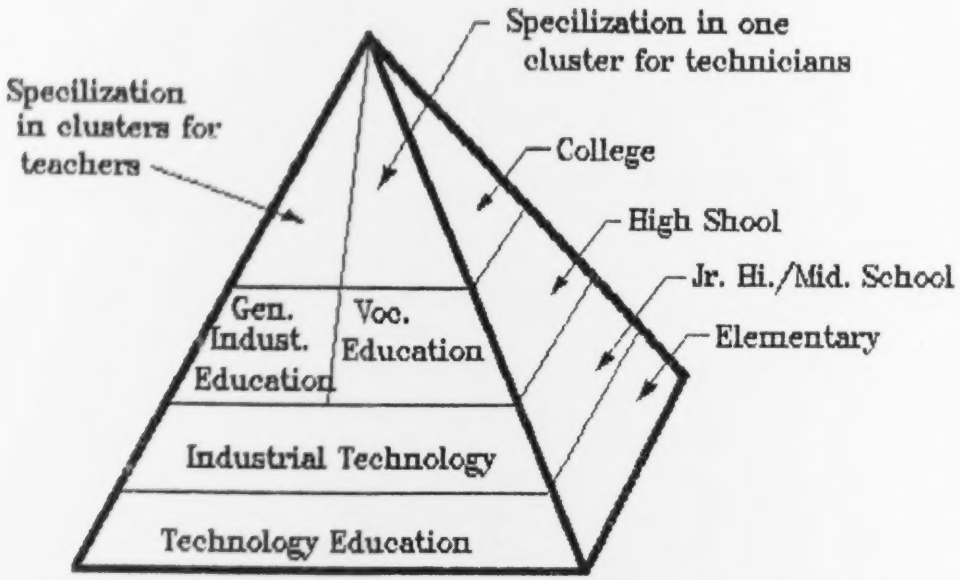
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Figure 1.